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WORKING PAPER

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ASSEMBLY — 40TH SESSION

TECHNICAL COMMISSION

Agenda Item 30: Other issues to be considered by the Technical Commission

DISTRIBUTED UAS OPERATION CERTIFICATE

(Presented by China)

EXECUTIVE SUMMARY

This working paper summarizes upon a pilot project undertaken by Civil Aviation Administration of China (hereinafter referred to as CAAC) of licensing an air operator and its management system under the circumstance of distributed unmanned aircraft systems (UAS) (hereinafter referred to as D-UAS) operations. Considering the increasing complexity of UAS operation scenarios worldwide, one pilot controlling a single or multiple UAS manually or through remote operation and control can no longer meet the operating condition's needs in aspects of control accuracy and efficiency as well as safety. Due to the fast evolving of UAS autonomy level, distributed operations represent the industrial development trend. Due to a wide variety of methodologies used in dividing flight phases and crew responsibilities in D-UAS operations as well as low correlation between system safety and the individual pilot's competence and experience, identifying the core competencies on the part of pilots within the system is neither feasible nor necessary, therefore, the traditional mechanism of pilot licensing based on the required competencies is faced with substantial challenges. To explore the feasibility of abandoning the license issuance to the individual pilot involved in the D-UAS on the premise of ensuring the same level of operational safety, CAAC launches a pilot project in developing a new regulatory strategy for D-UAS operational qualification, so as to meet the needs of technological evolution and industrial development.

Action: The Assembly is invited to:

a) introduce CAAC pilot project of D-UAS Operation Certificate (hereinafter referred to as DOC) to Member States and, where necessary, assist Member States in obtaining information on this project;
b) request the Council to pay close attention to the certification strategy of D-UAS operational qualification and to analyse the feasibility of DOC issuance; and
c) request the Council, once the feasibility is established, to amend relevant annex(es) to introduce Standards and Recommended Practices (SARPs) for DOC.

Strategic Objectives:	This working paper relates to Air Navigation Capacity and Efficiency Strategic Objective.
Financial implications:	N/A
References:	

[1] English and Chinese versions provided by China.

1. INTRODUCTION

Traditional pilot licensing strategy

1.1 Competency-based training and assessment is at the core of traditional mechanism of licensing each individual pilot. This mechanism features using a systematic approach to identify the required competencies and the specific performance standards, targeting the training toward the required competencies, and conducting assessment as to whether the competencies have been achieved upon completion of the training.

Challenges facing the traditional licensing strategy

1.2 With ever increasing autonomy level, UAS has been able to fly automatically based on the pre-programmed flight plan, with the pilot remotely managing the system and monitoring and handling abnormalities. The UAS systems provided by many manufactures have allowed for the distribution and modularization of operational control elements, enabling multiple pilots to operate collaboratively at the same time. This technological progress will drive a scale-up of beyond visual line of sight operations, characterizing autonomous flight by the system coping with the specific operation scenario's complex environment. Multiple UAS would be under remote monitoring by multiple pilots in a distributed phase-by-phase and task-by-task mechanism at the same time. Competency-based training and assessment used in the traditional licensing strategy are challenged in the following aspects:

1.2.1 Lack of means in identifying UAS pilot competencies and performance standards

1.2.1.1 Compared with manned aircraft operations, UAS operation scenarios are more complex and diverse. With the deep integration of the role of the pilot into the system, manual intervention authority is on continuous decrease in D-UAS operations. In addition, a greater variety of methodologies are used in the division of flight phases and monitoring responsibilities (i.e., based on navigation data sets, flight phases, or control procedure module), and the same holds true to possible combinations of flight phases or crew duties. Without the basis of an independent role as well as a relatively fixed and unified duty and responsibility attribute on the part of pilots in D-UAS operations, there is no means to establish universally accepted competency requirements in such aspects of knowledge, skills and attitude. If competencies and performance standards in D-UAS operations are determined based on the aggregation of all possible roles and responsibilities a pilot may undertake, the licensing scheme may be extremely complex, and a tremendous waste of administrative resources may be resulted.

1.2.2 No need in identifying D-UAS pilot competency and performance standards

1.2.2.1 D-UAS operation is composed of multiple subtasks, distributed at several ground control stations or terminals and operated collaboratively by multiple pilots, which is sharply contrasted with the operation of manned aircraft or conventional unmanned aircraft. The system's operational safety is mainly based on the design of risk control system and its continuous improvement targeted toward the specific operation scenario, dependent upon automation system's safety performance and reliability and the system's processing mechanism (i.e., operating procedures, emergency response program's design and implementation, and etc.), rather than continuous training and assessment on the part of pilots. With the correlation between D-UAS operation safety and the pilots' competence significantly decreasing, the required competencies are closely related to and tremendously varied with system autonomy level, system suppliers, the specific operation scenario, etc. While the role of D-UAS pilots is losing professional characteristics and the required core competencies and performance standards are decentralized, the practical basis of establishing core competencies and standards does not exist.

1.2.3 Traditional pilot licensing scheme does not make sense to D-UAS operations.

2. DISCUSSION

2.1 D-UAS operations, refers to operations composed of multiple subtasks, distributed at several ground control stations or terminals and operated collaboratively by multiple pilots, which does not require individual to possess full operating capabilities.

2.2 The issues faced with D-UAS operations can be solved by using the DOC licensing strategy through:

2.2.1 Recognizing the safety management role a pilot plays in D-UAS operations. The pilot in a traditional aircraft serves as a backup for equipment failures; for D-UAS operations, due to high cost and technical complexities associated with the pilot serving as a backup, it is common practice to have an extra item or set of equipment in place and set the pilot to monitor and switch on/off the equipment (if no automatic switching function).

2.2.2 Delimiting the responsibility of D-UAS pilot. One of the major considerations for pilot licensing is to delimit safety responsibilities. Due to the low correlation between D-UAS operation safety and the pilots' core competencies as well as the limitation of the pilot's intervening authorities, pilots shall not be held fully accountable for systematic safety risks derived from controlling error. The licensed pilot is fully responsible for all the consequences resulted from control error under the traditional licensing mechanism, which is obviously not applicable to D-UAS operations. It is suggested that the representative designated by the holder of the DOC should be ultimately responsible for the safe conduct of flight operations.

2.3 Key issues related to DOC licensing strategy

2.3.1 DOC vs AOC

a) DOC applicable scope or phase: aggregation of all relevant systems and personnel which may intervene (automatically or manually) UAS operation from the phase of take-off to landing. This certificate is irrelevant with dispatch, maintenance or security functions associated with traditional airline operations.

b) DOC may be integrated into the operator's approved Operations Specification.

3. IMPACT ASSESSMENT

3.1 With the increasing autonomous level of the UAS, DOC issuance will provide support for the gradual adjustment of regulatory policy regarding the pilot licensing involved in the D-UAS.

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